

Pink Hibiscus Mealybug (PHM)

Maconellicoccus hirsutus (Green)



**Credits: Lance Osborne, Catharine Mannion, Karolynne Griffiths, Paul Hornby,
Amy Roda and Dale Meyerdirk**

Pink Hibiscus Mealybug Project

Information provided for this presentation has been taken from numerous educational resources which have been primarily produced by the United States Department of Agriculture, Animal Plant Health Inspection Service, Plant Protection and Quarantine.

Pink Hibiscus Mealybug

Introduction

- Serious threat to agricultural, ornamental, and horticultural plants in tropical and subtropical areas
- Commonly found in tropical Africa, India, Egypt, northern Australia, and SE Asia where it feeds on more than 300 plant species
- In the 1990's, it was discovered in the Caribbean and has spread throughout the islands

PHM Spread

- **1912** – Egypt
- **1984** – Hawaii
- **1994** – Grenada, Carriacou
- **1995** – Trinidad, St. Kitts and Nevis
- **1996** – Tobago, Aruba, St. Maarten, St. Lucia
- **1997** – St. Eustatius, Curacao, Anguilla, Guyana, British Virgin Islands, St. Vincent, St. Croix, St. John, St. Thomas, Grenadines, Cuelbra, Vieques
- **1998** – Montserrat, Puerto Rico, Guadeloupe
- **1999** – Martinique, Belize, Mexico, Venezuela, USA-California
- **2000** – Barbados, Bahamas
- **2001** – Antigua, Dominica, Suriname
- **2002** – Haiti, Dominican Republic, USA - Florida

Pink Hibiscus Mealybug

Forms colonies of white cotton-like egg masses on the leaves, terminals, stems, fruits and branches



APHIS

Pink Hibiscus Mealybug

Host Plants

Fruits

- Papaya
- Sugar-apple
- Golden apple
- Pigeon pea
- Carambola
- Soursop
- Cherry
- Passion fruit
- Avocado
- Mango
- Plum
- Grape
- Citrus
- Breadfruit
- Guava
- Banana

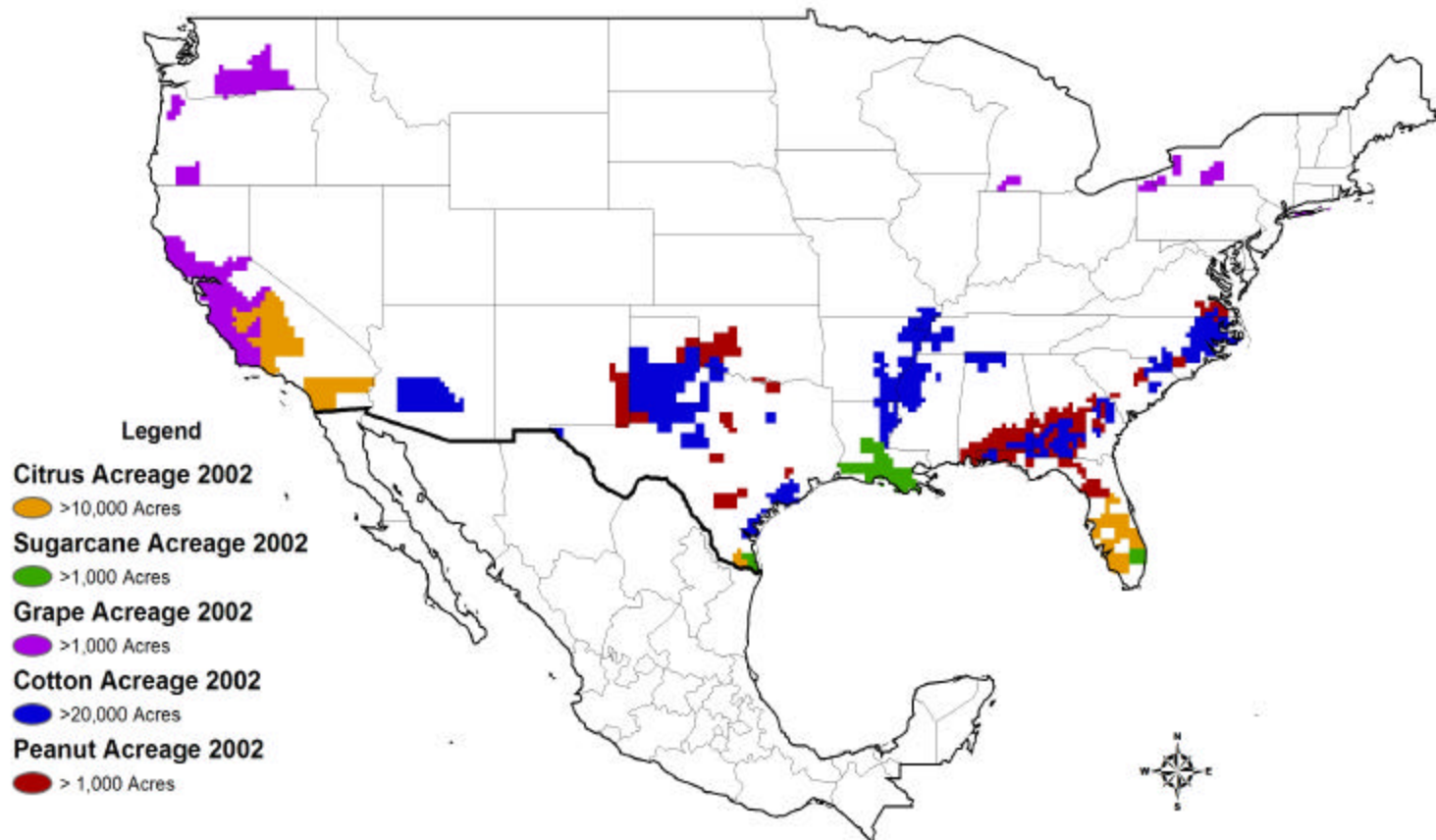
Ornamental

- Hibiscus
- Croton
- Allamanda
- Anthurium
- Heliconia
- Lantana
- Seagrape
- Bougainvillea
- Oleander
- Ixora
- Ginger lily
- Schefflera
- Ficus

Vegetable

- Tomato
- Pumpkin
- Okra
- Lettuce
- Beans
- Cucumber
- Peppers
- Dasheen
- Cabbage
- Squash

U.S. Crop Distribution Map



Five agricultural commodity hosts of pink hibiscus mealybug, *Maconellicoccus hirsutus*, based on county level data from National Agricultural Statistics Service data 2002.

Pink Hibiscus Mealybug

All stages are pink to reddish-brown in color, but are covered in white, mealy wax, with the body color showing through



Pink Hibiscus Mealybug

When a large mealybug is crushed, they produce a reddish liquid



Pink Hibiscus Mealybug

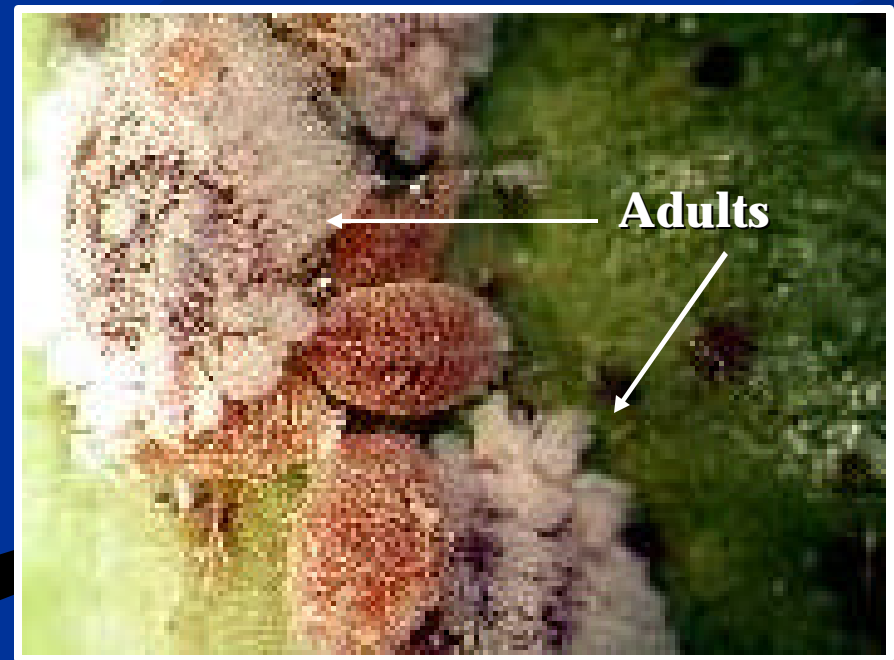
Adult Female

- Lays eggs within a white cotton-like secretion (ovisac)
- Each female lays from 80 to 600 pink eggs
- Newly hatched crawlers are mobile
- Prefer the apical and tender regions of the host plant, but under field conditions older parts of the plant may harbor large populations

Pink Hibiscus Mealybug

Adult Female

- Approx. 1/8 inch long, oval shaped, and wingless
- Have two short, inconspicuous wax caudal filaments and no lateral filaments



Pink Hibiscus Mealybug



Adult Female
with Eggs

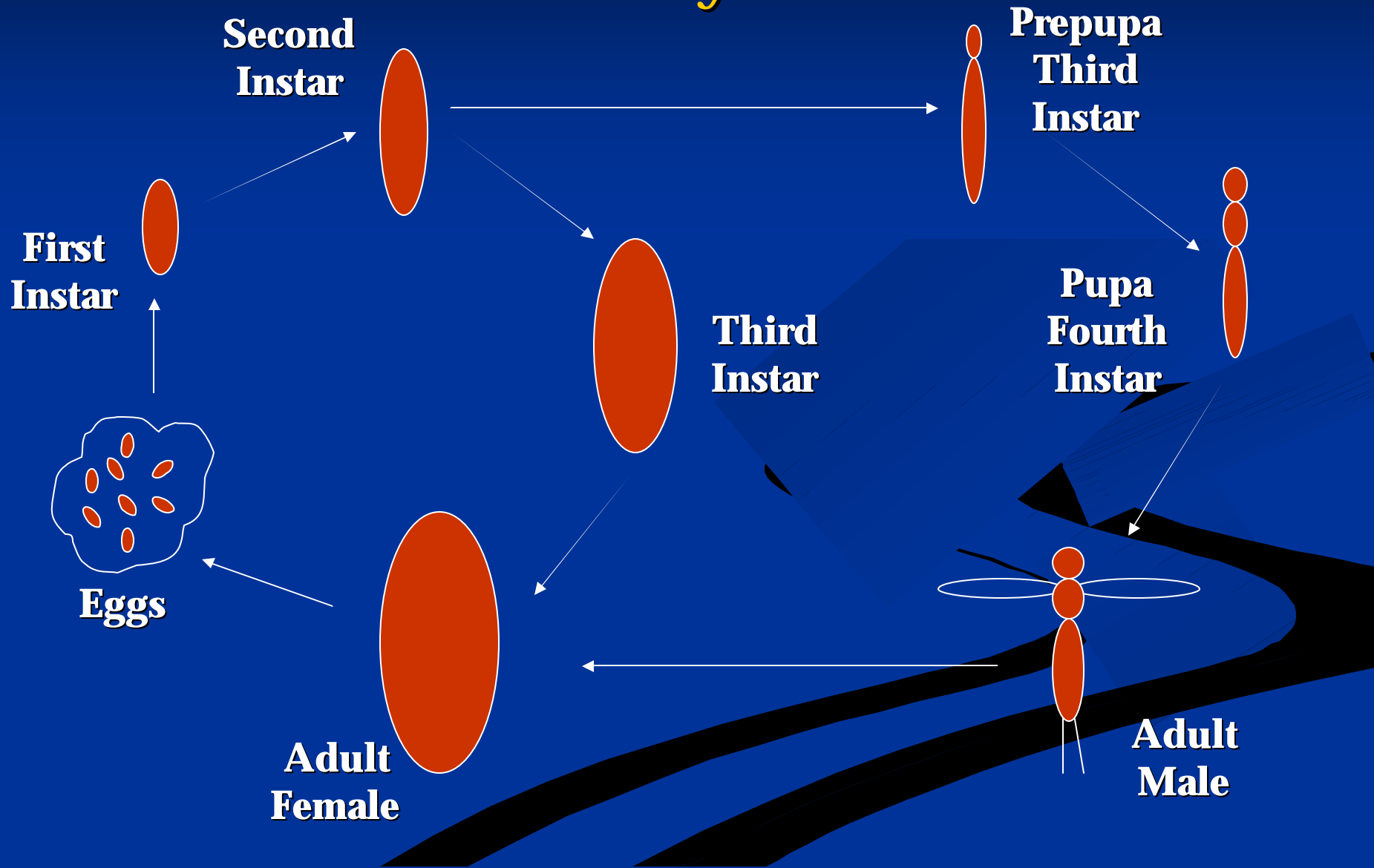
Pink Hibiscus Mealybug

Adult Male

- Smaller than the female and has reddish-brown coloration
- One pair of wings and two long wax caudal filaments
- Non-functional mouthparts; live for only a few days



Pink Hibiscus Mealybug Life Cycle



Life Cycle of PHM (Mani 1986)

■ Egg = 5.5 days

	<u>Males</u>	<u>Females</u>
■ 1 st Instar =	6.60 days	6.71 days
■ 2 nd Instar =	6.51	6.55
■ 3 rd Instar =	1.0	7.90
■ 4 th Instar =	<u>5.59</u>	<u> </u>
Total	24.85	26.31

■ Pre-oviposition = 4 to 5 days

■ Oviposition = 6 to 8 days

■ Fecundity = 386 to 540 eggs/female

Pink Hibiscus Mealybug Plant Damage

Mealybugs suck plant juices and inject a toxic saliva into the plant causing damage or potential death



Pink Hibiscus Mealybug

PHM colonies on hibiscus in the landscape



Pink Hibiscus Mealybug Plant Damage

Susceptible hosts can develop malformed leaves



Pink Hibiscus Mealybug Plant Damage



Stunted leaves and
terminal growth
(bunchy top)

Pink Hibiscus Mealybug Plant Damage



Deformed
flowers



Comparison to Other Mealybugs

Photo by UF: Osborne



Citrus

Photo by UF: Osborne



Longtailed

Photo by UF: Osborne



Madeira

Photo by UP: Glenn



Pineapple

Photo by UP: Osborne



Pink hibiscus

Photo by UF: Osborne



Solanum

Comparison to Other Mealybugs



Maconellicoccus hirsutus

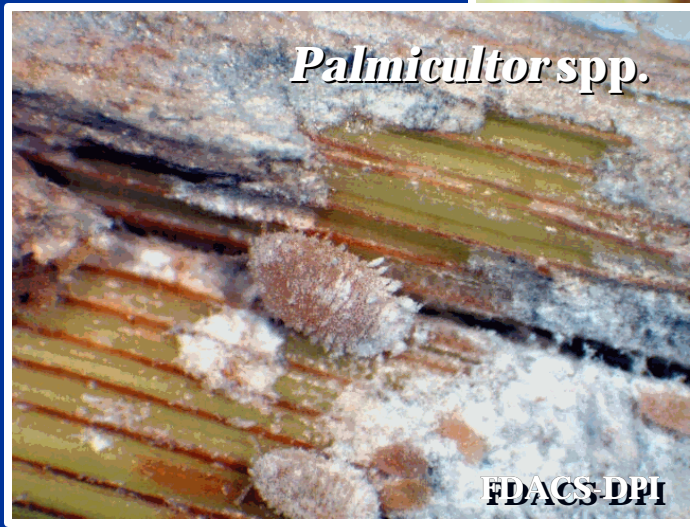
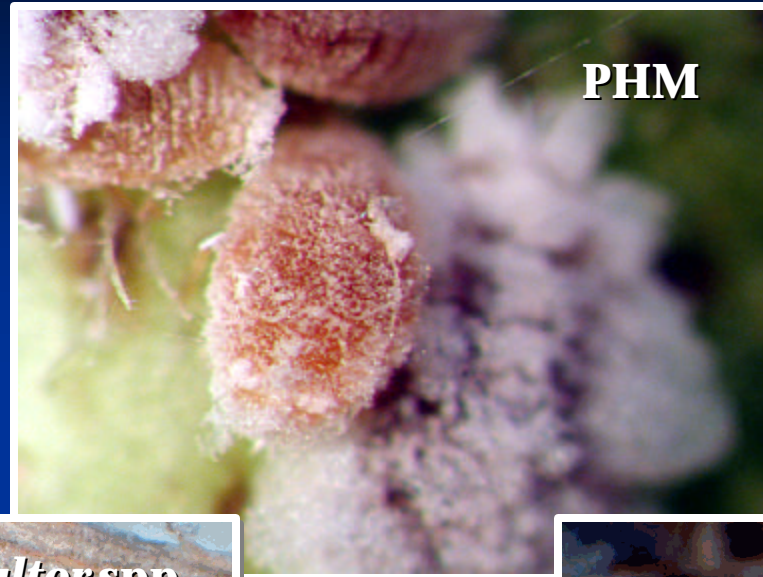
- Pink body, elliptical to oboval in shape (not round)...
- Hibiscus and many other hosts
- Eggs pink



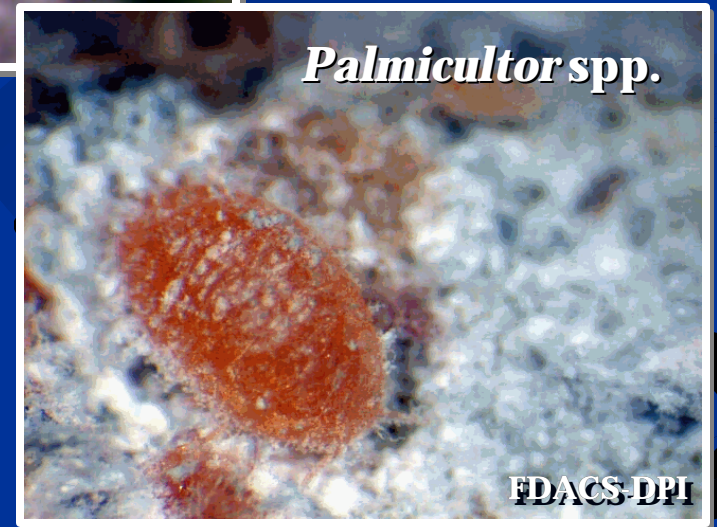
Hypogeococcus pungens

- Pink body, round...
- Portulaca, Acalypha and *Alternanthera*
- No eggs observed

Comparison to Other Mealybugs



Red body, lateral filaments



Pink body, Bamboo only

Pink Hibiscus Mealybug

Differences from Other Types of Mealybugs

- Presence of the toxin (i.e. plant damage)
- Pink to reddish-brown color (red colored fluid when crushed)
- No lateral filaments
- Two short caudal filaments
- Loose, cottony ovisac, pink eggs

Pink Hibiscus Mealybug Spread

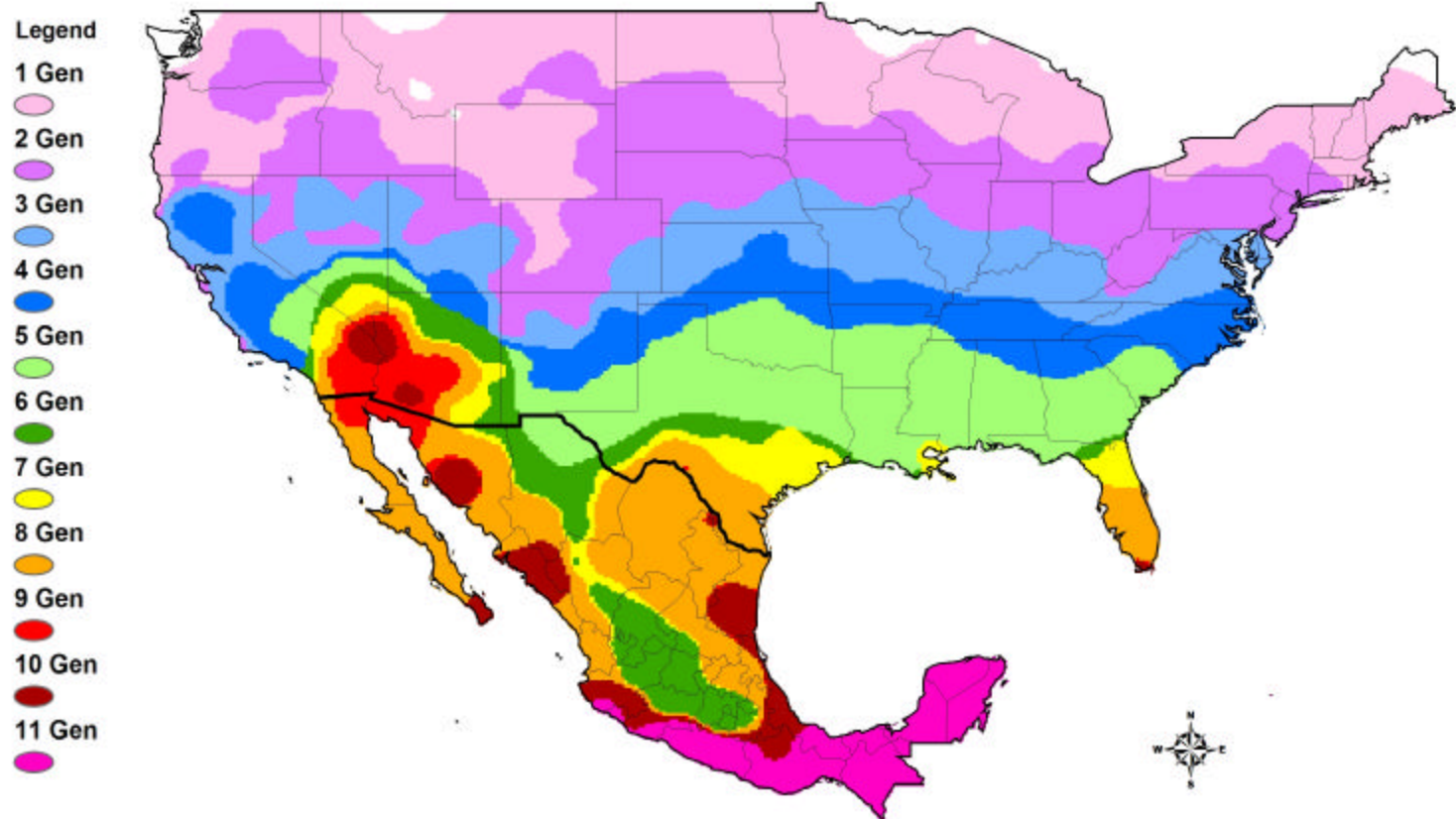
Mealybugs are spread naturally by wind, birds, ants and other wildlife, or more commonly by people moving infested plant material to noninfested areas

**Do not move infested plants
without proper instruction**

Pink Hibiscus Mealybug Problems in Management

- Wide host range
- Easily spread
- Wax coating, dense colonies and distorted foliage provides some protection from pesticides
- Not only on foliage and fruit of plants, but can also hide in cracks and crevices on the bark
- Can fall or crawl off and lay eggs on non-host plants and inanimate objects (wooden fence, dog house etc.)
- Protected from natural enemies by some ants

PHM Potential Distribution



Potential number of pink hibiscus mealybug, *Maconellicoccus hirsutus*, generations in U.S. and Mexico, based on the requirement of 300 degree days per generation and a base developmental temperature of 17.5° C.

NATURAL ENEMIES

A stylized landscape illustration in the bottom right corner. It features a dark blue background with a winding, light blue river or path that curves from the bottom right towards the center. The path is bordered by dark, jagged shapes that resemble rocks or a shoreline. The overall style is graphic and minimalist.

Role of Natural Enemies

- Reduce populations to very low numbers
 - Plants in natural areas show no apparent damage
 - Less PHM migrating to nursery stock
 - Less PHM to control with other management strategies (e.g. pesticides)



Exotic Parasitoids Introduced

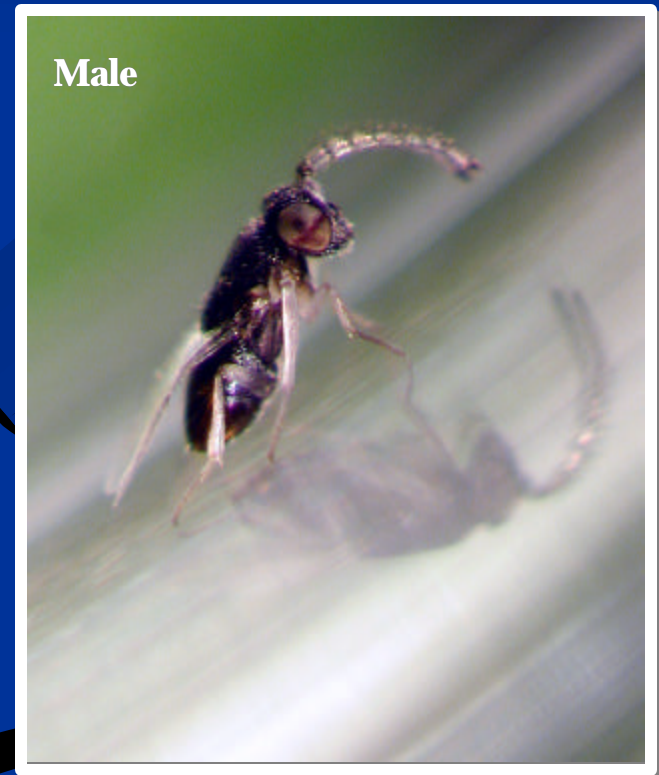
- *Anagyrus kamali*
 - China
 - Hawaii
 - Taiwan

- *Gyranusoidea indica*
 - Egypt
 - Australia

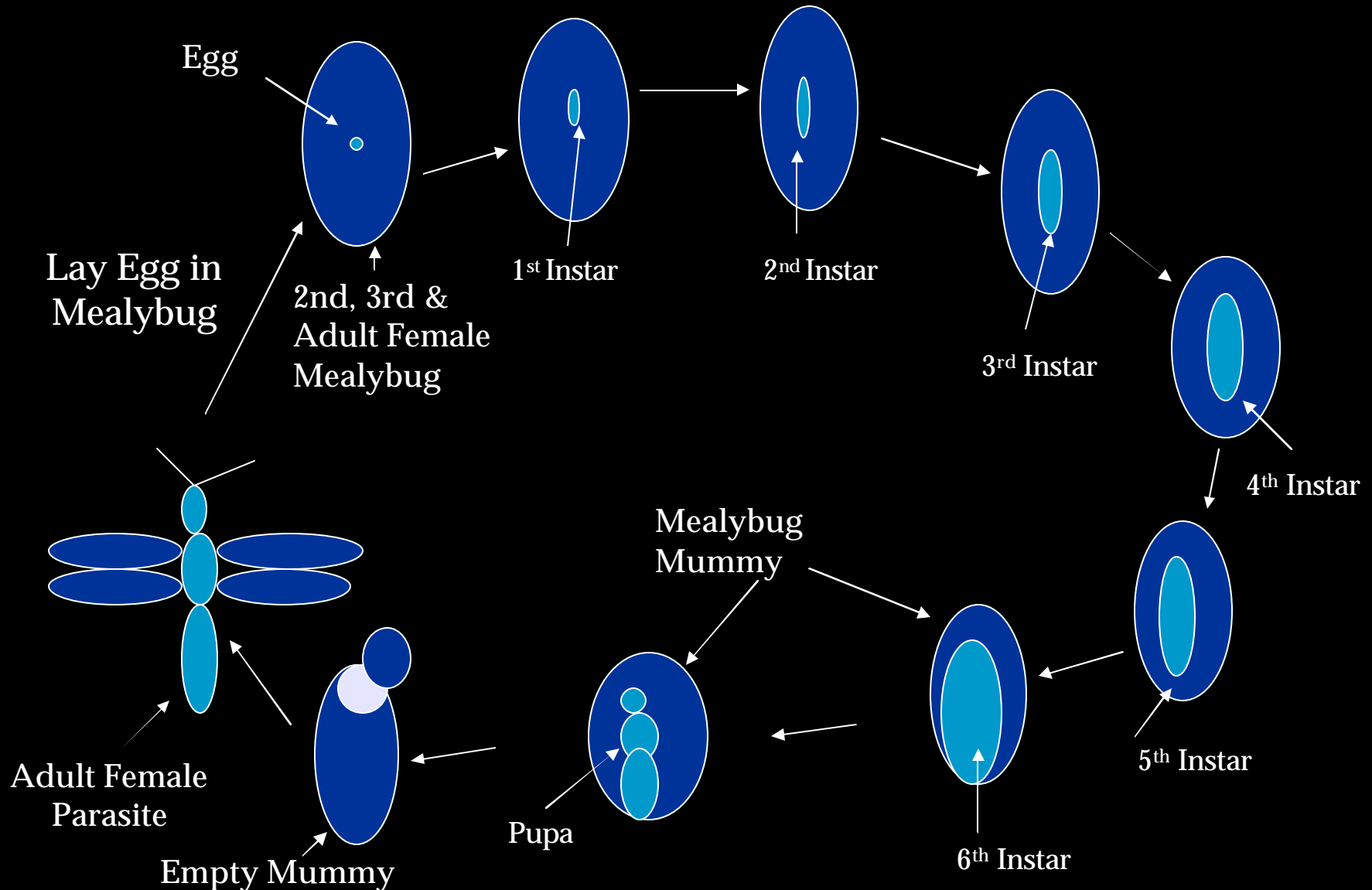
- *Allotropa mecrida*
 - Egypt
 - Puerto Rico

Exotic Parasitoids Introduced

- *Anagyrus kamali*
 - 6 instars
 - Sex ratio: 1:1
 - Life cycle: 18 days at 26 °C



Development Cycle of Parasitoid (*Anagyrus* spp.)



PHM Parasitoid Success Track Record

- Caribbean, California and Florida
 - Consistent >90% reduction in PHM populations
 - Sustained control (> 4 years where monitored)
 - Parasitoids persist
- Visual proof – ubiquitous, non-chemically treated hosts (e.g. Florida Trema) without large populations of PHM
 - Rare to see wild host plants with heavy PHM populations in areas where parasitoids released

PHM Populations Reduced by Parasitoids

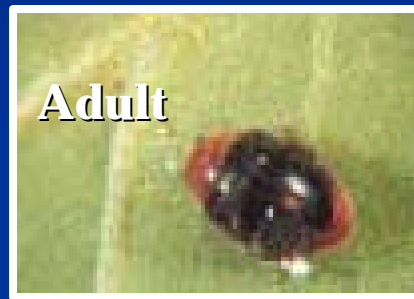
- St. Kitts = 91.6 %
- US Virgin Islands
 - St. Thomas = 91.2%
 - St. Croix = 97.1%
- Puerto Rico = 92%
- Culebra = 96.5%
- Vieques = 97.8%
- Belize = 96.6%
- California
 - Mulberry = 96%
 - Carob = 93%
- Bahamas = 82% (1 year)
- Florida = 98.7%
- Haiti = 97.2%
- Dominican Republic = 96.6%

Pink Hibiscus Mealybug

Predator

Cryptolaemus montrouzieri (Coccinellidae)

- Redheaded Lady Beetle -



Pink Hibiscus Mealybug Management in the Landscape

- **Do not move infested plants!**
- Do not use insecticides
- Do not use oils/soaps
- Do not release predators in conjunction with parasites – consult with State personnel

Pink Hibiscus Mealybug Management in the Landscape

- If you suspect you have the mealybug, contact your local county agent or a designated resource in your area to discuss options and the availability of natural enemies.
- *Anagyrus kamali* and *Gyranusoidea indica* parasitoids are the long term control solution.
- Parasitoids will be released at strategic locations for establishment and dispersal through the cooperative efforts of the USDA, APHIS, PPQ and the Department of Agriculture in your state.

Pink Hibiscus Mealybug Management in a Nursery

Scout or monitor for mealybugs

- Check above and below plant parts for presence of the mealybug
- Check surrounding areas (plants outside of nursery, pots, benches, etc.)
- Watch for “typical” damage
- Inspect plant material moving in from other nurseries

Preventative treatments

- Insecticides
- Soaps and oils

Quarantine treatments

- Plant destruction
- Insecticides

DO NOT CONSIDER BIOLOGICAL CONTROL

Current Quarantine Treatment

Initial Treatment:

Soil drench of a neonicotinoid (i.e., imidacloprid, dinotefuran, or thiamethoxam) must be followed by a foliar application of either:

- Bifenthrin (such as Talstar)
- Chlorpyrifos (such as Dursban)
- Acephate (such as Acephate, Orthene)

Contact local/state extension personnel for ALL pesticide recommendations.

PHM Web Sites

- **Pest Alert :** <http://www.aphis.usda.gov/lpa/pubs/phmpaler.pdf>
- **ID Card:** <http://www.aphis.usda.gov/lpa/pubs/phmidcar.pdf>
- **Pamphlet:** <http://www.aphis.usda.gov/lpa/pubs/phmealyb.pdf>
- **Manual:** http://www.aphis.usda.gov/ppq/manuals/pdf_files/phm.pdf
- <http://www.bugwood.org/factsheets/mealybug.html>
- <http://mrec.ifas.ufl.edu/lso/PinkMealybug.htm>

The following organizations work cooperatively in managing PHM and serve as points of contact regarding public outreach, training, scientific support, and regulatory initiatives.

